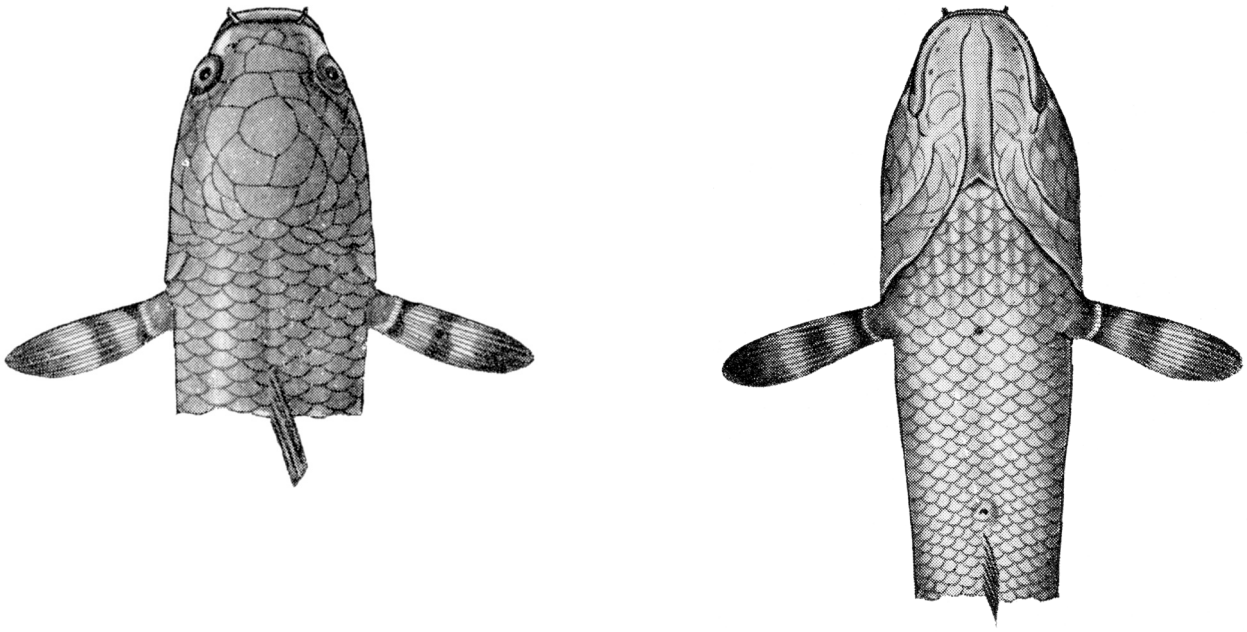
Channa burmanica Chaudhuri, 1919
Burmese Snakehead



After Chaudhuri, 1919

Left: dorsal view; **Right:** ventral view

Original description: *Channa burmanica* Chaudhuri, 1919:284-286, fig. 4. Report on a small collection of fish from Putao (Hkamti Long) on the northern frontier of Burma. Records of the Indian Museum 16:271-287. Type locality: Putao Plains of northern Myanmar, river Sen-Ben-Ti. Holotype: ZSI F9755.

Synonyms: Synonyms unknown.

Common name: **Burmese snakehead.**

Native range: Endemic to headwaters (Kiu River, perhaps Lang basin) of the Ayeyarwaddy (=Irrawaddy) River in northern Myanmar, between the Kumon and Shan-ngaw mountain ranges.

Introduced range: No introductions known.

Size: Maximum size unknown. Chaudhuri's (1919) largest specimen (one of four) was 106 cm total length. The species doubtlessly reaches a greater length, but cannot be considered as one of the moderate-to-large snakehead species.

Habitat preference: No specific information in Chaudhuri's (1919) publication.

Temperature range: No specific information. The type locality (Putao Plains) is about 27º N, indicating a subtropical to warm temperate species.

Reproductive habits: No specific information. The Burmese snakehead may show reproductive habits similar to its closest relative, *Channa bleheri*.

Feeding habits: No specific information. Perhaps similar to that of *Channa bleheri*.

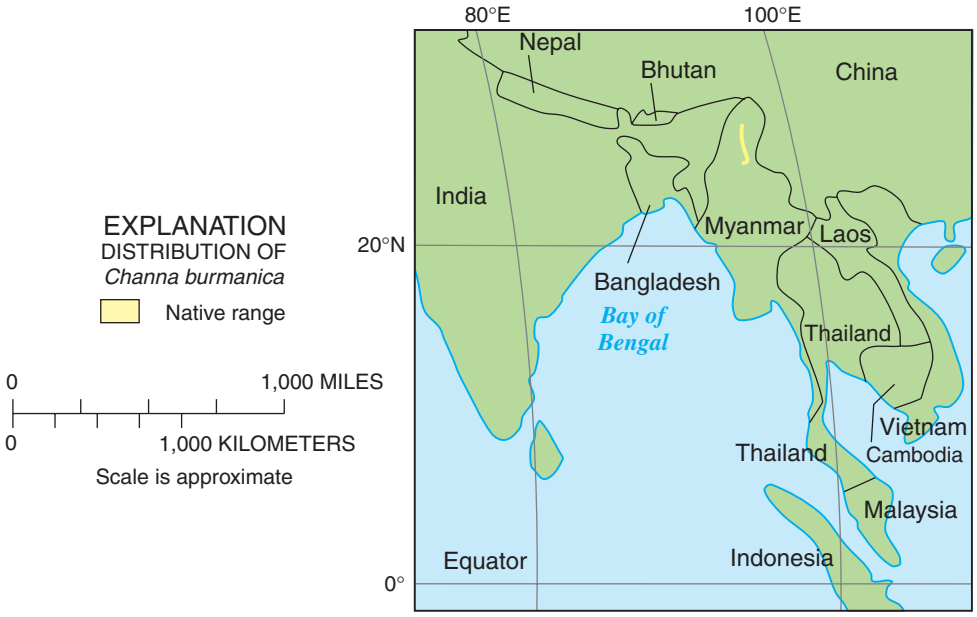
Characters: No area of scales in the gular region. No pelvic fins. Dorsal rays 38; anal rays 28. Lateral line scales 51 (50 pored scales), with lateral line dipping ventrally after the 12th scale (scale in disjunction without pore). Predorsal scales 8.

This species appears to be most closely related to *Channa bleheri* (Peter Ng, personal commun., *in* Vierke, 1991b). See account for *C. bleheri* for species differences.

Commercial importance in the United States: None known.

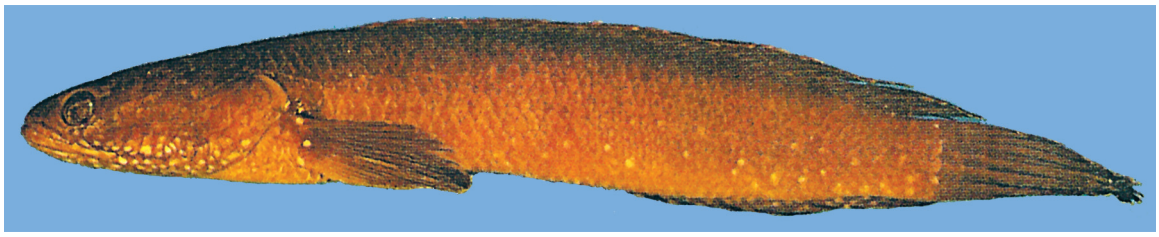
Commercial importance in native range: Unknown.

Environmental concerns: Doubtlessly a predator and likely feeding on other fishes. Like *Channa bleheri*, this species has potential to establish in much of peninsular Florida, Hawaii, perhaps southern Texas, and thermal springs and their outflows in the American west if introduced.

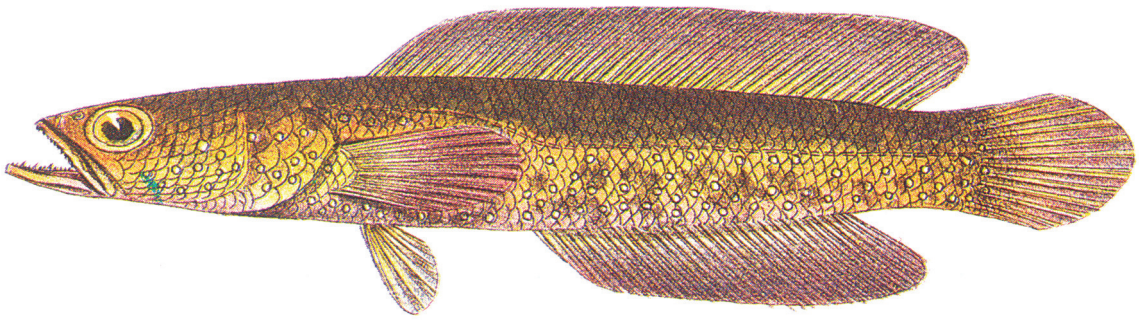


Channa burmanica

Channa cyanospilos (Bleeker, 1853)
Bluespotted Snakehead



Reprinted with permission from P.K.L. Ng from: Lee, P.G., and P.K.L. Ng. 1991. The snakehead fishes of the Indo-Malayan region. Nature Malaysiana 16(4):112-129.



After Bleeker, 1878

Original description: *Ophicephalus cyanospilos* Bleeker, 1853:256. Bleeker, P. Disgnostiche beschrijvingen van nieuwe of weining bekende vischsoorten van Sumatra. Tiental V-X. Tijdrschr. Neder. Indië 4:243-302. Type locality: Telok Betong (presently Bandar Lampung), southern Sumatra, Indonesia. Holotype locality unknown.

Synonyms: (?)*Ophiocephalus striatus* Weber and de Beaufort, 1922.

Channa sp. Ng and Lim, 1990.

(?)*Channa striata* Ng and Lim, 1990.

Common names: None known. The authors propose **bluespotted snakehead** as this character remains obvious in preserved specimens and is unknown in other channids from Indonesia or Malaysia (Ng and Lim, 1991).

Native range: Sumatra and probably peninsular Malaysia and Kalimantan (Kapuas basin, western Borneo; Ng and Lim, 1991). Also found during 1995-1996 in Riau and Jambi, central Sumatra (Peter Ng, personal commun., 2003).

Introduced range: No introductions known.

Size: To at least 20 cm (Ng and Lim, 1991).

Habitat preference: No specific information, but known from a tributary in the Sungei Alas (Alas River) basin, northern Sumatra.

Temperature range: No specific information. The known native range of this species is between 3º N and 6º S, indicating a tropical, equatorial taxon.

Reproductive habits: No information located. Probably a nest builder that guards its eggs and young like other snakeheads.

Feeding habits: No information found. Likely a thrust predator as other snakeheads.

Characters: No patch of scales in gular region of head. Dorsal fin rays 38-43; anal fin rays 24-26.

Lateral line scales 51-55; predorsal scales (posterior to cephalic shields) 8. Small canines present on lower jaw. Pale blue spots on the lower half of the body from gill cover to caudal peduncle, remaining visible in preserved specimens.

Weber and de Beaufort (1922) listed this species as a possible synonym of *Channa striata*, a practice followed for many decades. Ng and Lim (1990) cited the species in this same manner. Ng and Lim (1991), however, recognized the species as valid as did Kottelat and others (1993) and Musikasinthorn (2000). Ng and Lim (1991) allied *C. cyanospilos* with *C. melasoma*, rather than *C. striata*, based on morphological features, particularly with regard to the shapes of the throat region and ventral surfaces of the gill cover.

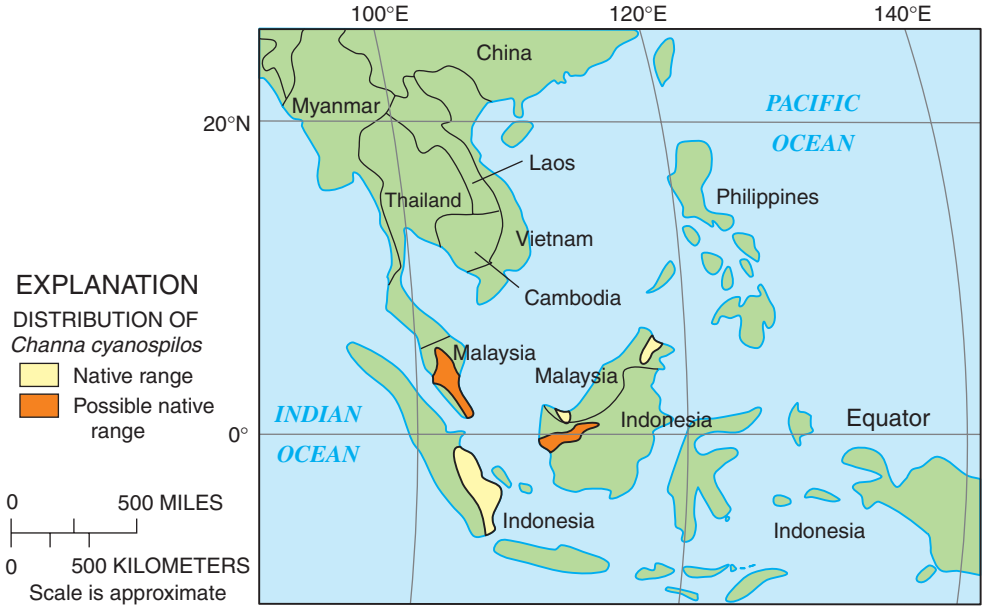
Channa cyanospilos can be separated from *C. melasoma* by lower jaw length (5 percent standard length in *C. cyanospilos*, 12-13 percent in *C. melasoma*). Both species also have 8 predorsal scales behind the cephalic shields (7 in *C. striata*).

Pale blue spots or blotches in the throat region of *C. cyanospilos* are similar to those in *C. melasoma*, but in the latter species the spots and blotches form a marbled pattern; *C. striata* lacks any blue spots in the throat region but has brown streaks and spots (Ng and Lim, 1991).

Commercial importance in the United States: Not listed on aquarist-oriented websites and probably has been unavailable in the aquarium fish trade. Not known to have been imported or available in live-food fish markets.

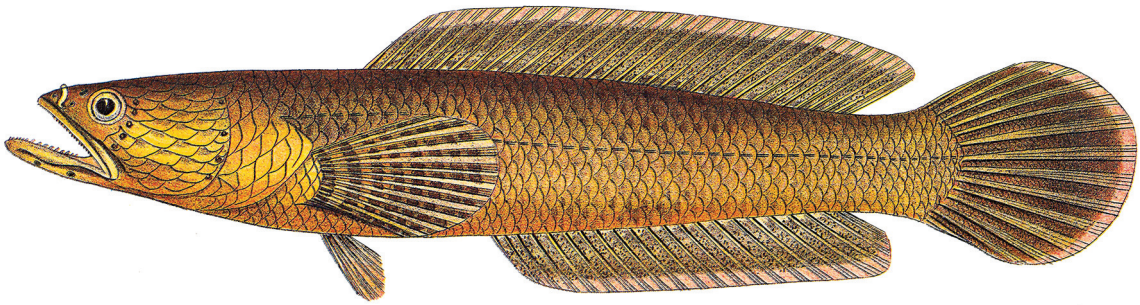
Commercial importance in native range: No information found. Probably occasionally caught by angling.

Environmental concerns: Likely a thrust predator with a diet that includes fishes. Nevertheless, this species is tropical and probably would survive only in extreme southern Florida, Hawaii, and thermal springs and their outflows if introduced.



Channa cyanospilos

Channa gachua (Hamilton, 1822)
Dwarf Snakehead



After Munro, 1955

Upper image: ZRC 41100, 107.7 mm standard length, from Perlis, Malaysia. **Lower image:** ZRC 41656, 46.5 mm standard length, from Kerala, India. Reprinted with permission from P.K.L. Ng from: Ng, H.H., P.K.L. Ng, and Ralf Britz. 1999. *Channa harcourtbutleri* (Annandale, 1918): a valid species of snakehead (Perciformes: Channidae) from Myanmar. J. South Asian Nat. Hist. 4(1):57-63.

Original description: *Ophicephalus gachua* Hamilton, 1822:68, 367. An account of the fishes found in the river Ganges and its branches. Edinburgh and London, i-xii + 1-405. Type locality: ponds and ditches of Bengal, India. Type specimens unknown.

Synonyms: *Ophiocephalus aurantiacus* Hamilton, 1822:69, 368, pl. 23, fig. 22.

Ophicephalus marginatus Cuvier, 1829:230, *fide* Roberts, 1993:38, Menon, 1999, and Ng and others, 1999:57.

Ophicephalus limbatus Cuvier, 1831, no p., pl. 201, *fide* Roberts, 1993:40, Menon, 1999:275, and Ng and others, 1999:57.

Ophicephalus marginatus Cuvier, 1831, no p., pl. 201, *fide* Roberts, 1993:38, Menon, 1999:275, and Ng and others, 1999:57.

Ophicephalus coramota Cuvier, 1831:414, *fide* Menon, 1999:275 and Ng and others,1999:57.

Ophicephalus fuscus Cuvier, 1831:414, *fide* Menon, 1999:275 and Ng and others, 1999:57.

Ophicephalus montanus McClelland, 1842:583, *fide* Menon, 1999:275, and Ng and others, 1999:57.

Philypnoides surakartensis Bleeker, 1849:19, *fide* Menon, 1999:275, and Ng and others, 1999:57.

Ophiocephalus apus Canestrini, 1861:77, pl. 4, fig. 7.

Ophiocephalus kelaartii Günther, 1861:472, *fide* Talwar and Jhingran, 1991;1019, Menon, 1999:275, and Ng and others, 1999:57.

Ophiocephalus guachua [sic] var. *malaccensis* Peters, 1868.

Ophicephalus gachna [sic] Jordan and Seale, 1907.

Ophiocephalus gachua kelaarti Günther: Munro, 1955:100.

Species is in need of revision; status of many synonyms uncertain (Ng and Lim, 1990; Ng and others, 1999). Roberts (1989), Lim and others (1990), Talwar and Jhingran (1992), and Rainboth (1996) treated this species as a synonym of *Channa orientalis*, but Ng and others (1999) disagreed with this conclusion. Day (1889), Coad (1981), Lim and others (1990), Kottelat (1998), Musikasinthorn (2000), and others considered *C. gachua* to be valid. For purposes of this report, we follow the most recent authorities in recognizing the species as valid, but also realizing that it doubtlessly represents a species complex.

Common names: **dwarf snakehead**; frog snakehead; brown snakehead; dolli or dauli (Pakistan); dheri dhok (Hindu); para korava (Tamil); doarrah (Punjab, India); chen-gah (Assam, India); cheng (West Bengal, India); dheridhok, chainga (Bijar Province, India); chenga (Orissa Province, India); malamatta-gudisa, erramatta, tatimatta-gudisa (Andrah Pradesh Province, India); koravu, vattudi (Kerala Province, India); mohkorava, mottu (Karnataka Province, India; Talwar and Jhingran, 1992), parandal kanaya (Sri Lanka; Pethiyagoda, 1991); bakak (Malay; Lim and Ng, 1990).

Native range: Bampur-Haliri basin and Mashkel River, southeastern Iran (Coad, 1979); Kabol (Kabul) drainage of Afghanistan (Coad, 1981); eastern and western Pakistan (Qureshi, 1965); India, Sri Lanka, Bangladesh, Myanmar, Thailand, Laos, Cambodia, Malaysia, Indonesia (Borneo), Java, southern China (Mukerji, 1933; Mendis and Fernando, 1962; Fernando and Indrassna, 1969; Roberts, 1989; Pearl River Fisheries Research Institute, 1991; Pethiyagoda, 1991; Talwar and Jhingran, 1992; Kottelat, 1998, 2001a; Musikasinthorn, 2000). Kullander and others (1999), citing Das and Nath (1971), recorded this species from the Punch Valley, in a tributary of the Jhelum River, in the Kashmir Valley of northeastern Pakistan/western Kashmir. Peter Ng (personal commun., 2003) reported its occurrence in the Toba area of northern Sumatra, and Riau and Jambi in central Sumatra in 1996, as well as in Yunnan Province, China, in 2000.

Introduced range: There may have been introductions that went unrecorded, but Kottelat's (1985) reference to *Channa orientalis* from the Greater Sunda Islands doubtlessly refers to some species of the *C. gachua* complex. Myers and Shapovalov (1932) cited a specimen of *C. gachua* from Formosa (=Taiwan) that lacked both pelvic fins. Because pelvic fins were absent, they tentatively identified the specimen as *C. orientalis* but noted other specimens of *C. gachua* from India that also lacked pelvics based on reports by earlier scientists. They suggested that this fish may have been introduced to Taiwan. This snakehead can be easily transported for great distances with significant altitude and temperature changes (Day, 1877). Peter Ng (personal commun., 2003) found this snakehead in Bali in 2000, perhaps within its native range or an introduction.

Size: This species is often referred to by authors as the smallest snakehead, reaching a length of about 17 cm (Kottelat, 1998). Lee and Ng (1991) stated that it rarely exceeded 20 cm. The smallest snakehead, however, is *Channa orientalis*, a species that rarely exceeds 10 cm in length (Pethiyagoda, 1991).

Habitat preference: Appears to prefer clear pools, shallow streams, and swamps, particularly in forested areas. Nevertheless, Pethiyagoda (1991) noted that it is common "in streams and ponds," but is tolerant of "very stagnant, poorly oxygenated, turbid water." Deraniyagala (1929) stated that it "flourishes in ponds rendered so stagnant as to prove toxic to most fishes."

Said to be largely a nocturnal fish. Habitat destruction, due to deforestation near Singapore, is considered a threat to this species (http://www.sci-ctr.edu.sg/ssc/imglib/vertebra/channa.html). Kottelat (1998, 2001a,b) reported this species from hill streams in Laos, Thailand, Cambodia, and Vietnam. Lim and others (1990) recorded finding it in forest streams in peninsular Malaysia. This snakehead is reported to tolerate a wide range of pH levels with 100 percent survival over 72 hours from pH 3.10 to 9.6 (Varma, 1979).

Lee and Ng (1994) reported the species "from rivers, lakes, ponds, well-shaded, small forest streams less than 20 cm deep, hillstreams not continuous to mountain ranges and in the upper zone of rivers." They indicated that it is found from sea level to an altitude of 1,520 m in India and up to 1,430 m in Malaysia, in waters with flow rates from stationary to rapids with a pH range of 3.1-9.6. Lee and Ng (1991) stated that the species is also found in mountain brooks up to 3,600 m above sea level. Mukerji (1931) reported capture of two specimens from the Billigirirangan Hills of southern India at an altitude of 751 m. The species has been reported surviving in brackish water, but this is doubted by Lee and Ng (1991). Srivastava and others (1980) noted decreasing body weight of this species in salinities as low as 5 ppm. They are capable of overland migrations (Lee and Ng, 1991), and Deraniyagala (1929) commented that it is "exceedingly active on land, pregressing by a series of leaps."

Temperature range: Lee and Ng (1994) indicated that this species can tolerate temperatures in hot springs in Sri Lanka to as low as 13 ºC. The species complex, however, is reported from as far north as Afghanistan (with cold winters) to Borneo and Java (equatorial tropical). Pethiyagoda (1991) cited Deraniyagala (1932) as having recorded this species from hot springs at 36.5 ºC.

Reproductive habits: This species has been cited as a mouthbrooder (Lee and Ng, 1991, 1994; Kottelat, 2001a) and confirmed by Ralf Britz (personal commun., 2003). An interesting factor here is that other authors (for example, Munro, 1955) made no mention of oral brooding of fertilized eggs and young for the dwarf snakehead. Based on Kahn (1924) and Deraniyagala (1929), Breder and Rosen (1966) stated that spawning in India occurs with the female swimming upside-down under the male, with eggs being released and fertilized in groups of 200-300 every minute or two. Females in Indonesia and Malaysia, however, are reported to produce from 20 to 200 eggs per spawning, with the male orally brooding developing eggs and fry (Lee and Ng, 1991, 1994), further evidence that *Channa gachua* is a species complex. This is one of three species of snakeheads known to spawn in ponds lacking vascular aquatic plants (Parameswaran and Murugesan, 1976b).

Bhuiyan and Rahman (1982) measured fecundity from 30 female *Channa gachua* collected near Rajshahi, Bangladesh, which ranged from 487 (94 mm specimen) to 4,482 (164 mm specimen). Mean fecundity of the 30 specimens was 2,307 oöcytes for a specimen having a mean length of 132 mm. The relationship between fecundity and length is largely linear, as is the relationship between fecundity and length of ovaries.

Mishra (1991) described mature (stage V) oöcytes as ranging from 2.1 to 2.6 mm in diameter with the highest percentage of stage V oöcytes in July from specimens collected near Berhampur, Orissa, India. The highest gonadosomatic index was 6.8 and occurred in June. Estimated fecundity ranged from 2,539 to 7,194 in 15 mature specimens ranging from 13.4 to 17.2 cm in length. Again, the relationship between fecundity and length, as well as fecundity and body weight, was largely linear.

Feeding habits: Lee and Ng (1994) summarized food preferences as including "mouse, rat, frog, tadpole, fish, Ephemerophtera and other insects, mosquito larvae, prawn (*Macrobrachium* sp.), crab (*Irmengardia johnsoni*), and other crustaceans." They cited the species as a nocturnal predator living at or near the substrate and quite capable of migrating overland.

Characters: No patch of scales in the gular region. Pelvic fins present, although Talwar and Jhingran (1992) stated that pelvics may be present or absent. Lateral line scales 39-47; 3½ scales between lateral line and base of anterior dorsal rays. Dorsal rays 32-37; anal rays 20-23. Lower jaw with 10-20 canines posterior to a single row of villiform teeth, the latter expanding to about 7 rows at the jaw symphysis. Dorsal, anal, and caudal fins with white (translucent in preserved specimens) margin; ocellated spot often present near posterior end of dorsal fin. The ocellated spot, however, may appear only in juveniles and females as occurs in *Channa orientalis*. Lim and others (1990) noted that while the fish is alive the dorsal, anal, and caudal fins are margined with red or yellow, and that the pectoral fins have semiconcentric rings and a dark area at the base.

Commercial importance in the United States: This species is occasionally mentioned on aquarist-

oriented websites and has been available for sale from certain aquarium fish dealers. Its small size makes it more appealing as an aquarium species. Too small to be sold in live-food fish markets.

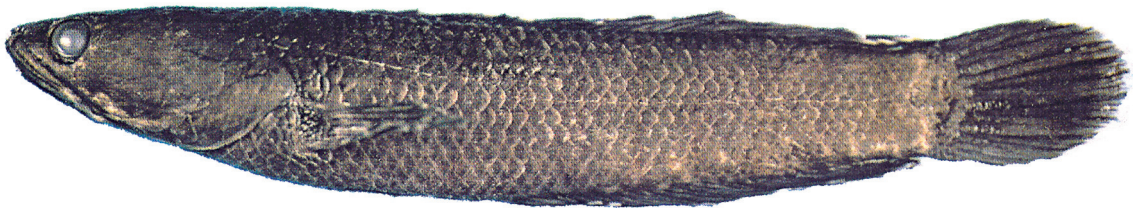
Commercial importance in native range: Talwar and Jhingran (1992) cited the species as of minor importance in India. According to comments on aquarist-oriented websites and in Ng and Lim (1990), members of this species complex appear to be of importance in the aquarium fish trade with individuals captured from the wild for sale or export. Ng and Lim (1990) cited individuals being sold for S$30-60 in Singapore, although Lim and Ng (1990) listed the species as endangered there. Pethiyagoda (1991) noted that it is largely unused as food or in the aquarium trade in Sri Lanka. Deraniyagala (1929) commented that this snakehead is utilized as food by "only the poorest classes" in Sri Lanka, adding that it is used as live bait to catch larger species, such as *Channa striata* and *C. marulius*.

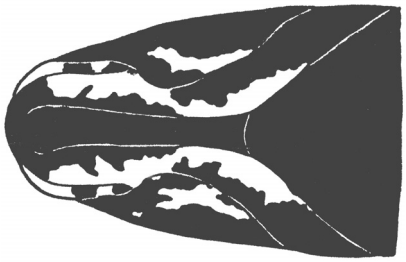
Environmental concerns: Like other channids, this species is a thrust predator, capable of breathing atmospheric oxygen. This species is noted by many authors as migrating overland.

Comments: The diploid number of chromosomes for *Channa gachua* is 78 from India (Banerjee and others, 1988) and 112 for specimens from Thailand (Donsakul and Magtoon, 1991), a strong indication that this represents a species complex.

Channa gachua

Channa harcourtbutleri (Annandale, 1918)
Inle Snakehead





Upper image: ZRC 42556, 111.3 mm standard length, Myanmar: Inle Lake. **Lower image:** ventral view of head illustrating pigmentation, ZRC 42556, 111.3 mm standard length. Reprinted with permission from P.K.L. Ng from: Ng, H.H., P.K.L. Ng, and Ralf Britz. 1999. *Channa harcourtbutleri* (Annandale, 1918): a valid species of snakehead (Perciformes: Channidae) from Myanmar. J. South Asian Nat. Hist. 4(1):57-63.

Original description: *Ophiocephalus harcourtbutleri* Annandale, 1918:54, pl. 2, fig. 7; pl. 4, figs. 16-17. Fishes and fisheries of the Inlé Lake. Rec. Indian Mus. (Calcutta), 14:33-64, pls. 1-7. Type locality: southern Shan State, Myanmar (Burma). Holotype: ZSI F9439/1.

Synonyms: (?) *Ophioceplahus gachua* (non-Hamilton, 1822) Boulenger, 1899:199.
Ophiocephalus harcourt-butleri Annandale, 1918:54.
(?) *Ophicephalus gachua* (non-Hamilton, 1822) Hora and Mukerji, 1934:135.
Ophiocephalus harcourtbutleri Tint Hlaing, 1971:517.
Channa orientalis Kottelat, 1989:20; Talwar and Jhingran, 1991:1019.
Channa harcourtbutleri Ng and others, 1999.

Common name: Inle snakehead.

Native range: Yawnghwe and nearby areas of Myanmar, particularly Inlé Lake in southern Shan State (Ng and others, 1999).

Introduced range: Not known to have been introduced.

Size: To about 16 cm.

Habitat preference: Annandale (1918) noted that the species occurred in Inlé Lake on "muddy bottom in sluggish streams … hiding as a rule among weeds."

Temperature range: No specific information in literature. Nevertheless, Inlé Lake lies at about 20.7º N, indicating that *Channa harcourtbutleri* is a tropical/subtropical species. Inlé Lake is at an altitude of about 1,000 m (Kullander and others, 2000).

Reproductive habits: No specific information in literature. Ralf Britz (personal commun., 2003) indicated that it is unknown if this species is a nest builder or mouthbrooder.

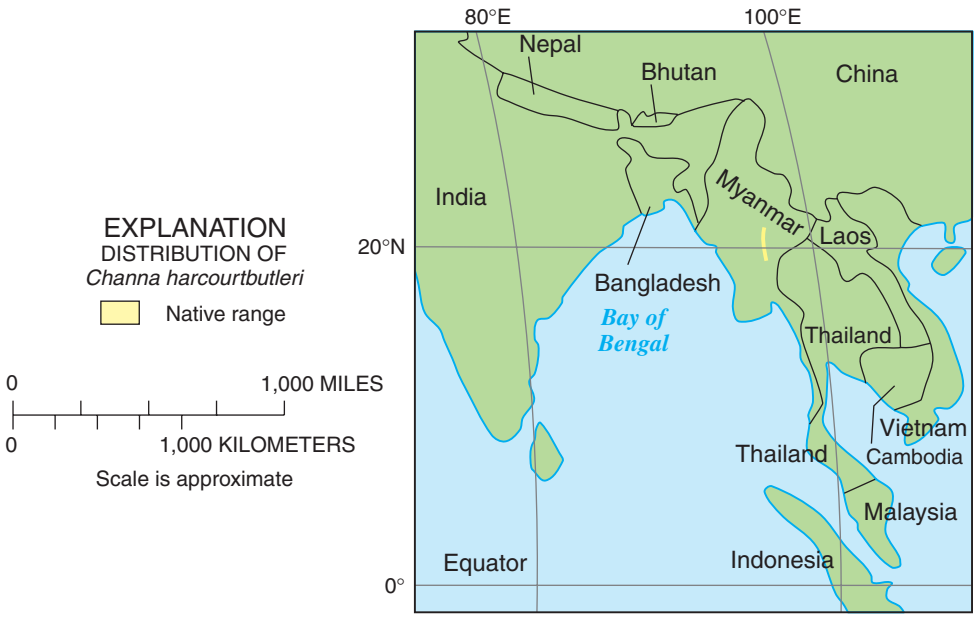
Food preferences: No specific information in literature. Likely a thrust predator as are other snakeheads (Ng and others, 1999).

Characters: No patch of scales in gular region of head. Lateral line curves downward between scales 15-16. Lateral line scales 44-45; transverse scales 4; predorsal scales 4. Dorsal fin rays 34-38 (mode 36); anal fin rays 23-26; pectoral fin rays 14-15 (mode 14) (Ng and others, 1999). This species is most closely related to *Channa gachua* from which it can be distinguished as follows: Head profile of *C. harcourtbutleri* flatter and less convex than in *C. gachua* resulting in a smaller postorbital head depth (30.9-35 percent head length versus 39.8-44 for *C. gachua*), its length 32-34 percent standard length versus 26.8-31.9 percent, and width 16.9-19 percent standard length versus 18.6-21.7 percent. Moreover, the snout of *C. harcourtbutleri* is more convex when viewed dorsally (Ng and others, 1999, figs. 3b,4a). The two species also differ in coloration (Ng and others, 1999) with *C. harcourtbutleri* never having an ocellus at the posterior end of the dorsal fin (occurring in subadult *C. gachua*).

Commercial importance in the United States: Not known to have been imported for any purpose.

Commercial importance in native range: Sold in live-food fish markets in the vicinity of Inlé Lake, Myanmar (Ng and others, 1999).

Environmental concerns: Although this species is tropical/subtropical and could potentially establish if released in southern Florida, Hawaii, and warm thermal springs and their outflows, its food habits are largely unknown (Ralf Britz, personal commun., 2003). Like other snakeheads, it may be a predator (Ng and others, 1999).



Channa harcourtbutleri